

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
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1. REPORT DATE (DD-MM-YYYY) 09/12/2017		2. REPORT TYPE Journal		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Clinical Mimics: an emergency medicine focused review of anxiety mimics Journal of Emergency Medicine				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Capt Ashley Werbin				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) 59th Clinical Research Division 1100 Willford Hall Loop, Bldg 4430 JBASA-Lackland, TX 78236-9908 210-292-7141				8. PERFORMING ORGANIZATION REPORT NUMBER  17380	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) 59th Clinical Research Division 1100 Willford Hall Loop, Bldg 4430 JBASA-Lackland, TX 78236-9908 210-292-7141				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
<b>14. ABSTRACT</b> <p>Background: Anxiety is the most common mental health diagnosis in the general population. Patients in the emergency department (ED) with anxiety attack may complain of heart palpitations, dyspnea, and chest pain. However, these non-specific complaints may be the manifestation of serious disease.</p> <p>Objective of Review: This review provides an analysis of various medical mimics of anxiety and an approach to their identification, evaluation, and management in the ED.</p> <p>Discussion: Approximately half of the patients seeking psychiatric emergency services for a supposed anxiety attack have a poorly treated or undiagnosed medical condition contributing to their symptoms. The symptoms of anxiety include dizziness/lightheadedness, paresthesias, chest pain, palpitations/tachycardia, sensations of shortness of breath, tachypnea, and nausea or abdominal upset. The approach to evaluation and management of these patients should include an assessment of the patient's airway, breathing, and circulation and focused history and physical exam.</p>					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT  UU	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Clarice Longoria
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (Include area code) 210-292-7141

**Title:** Clinical mimics: an emergency medicine focused review of anxiety mimics

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**Keywords:** anxiety, mimic, chest pain, shortness of breath, palpitations, nervousness, dizziness

**Conflicts of Interest:** NONE

**Acknowledgements:** This manuscript did not utilize any grants, and it has not been presented in abstract form. This clinical review has not been published, it is not under consideration for publication elsewhere, its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. This review does not reflect the views or opinions of the U.S. government, Department of Defense, U.S. Army, U.S. Air Force, SAUSHEC Transitional Year Residency Program, or SAUSHEC EM Residency Program. The views expressed are those of the authors and do not reflect the official views or policy of the Department of Defense or its Components.

## **Clinical Mimics: an emergency medicine focused review of anxiety mimics**

### **ABSTRACT:**

**Background:** Anxiety is the most common mental health diagnosis in the general population. Patients in the emergency department (ED) with anxiety attack may complain of heart palpitations, dyspnea, and chest pain. However, these non-specific complaints may be the manifestation of serious disease.

**Objective of Review:** This review provides an analysis of various medical mimics of anxiety and an approach to their identification, evaluation, and management in the ED.

**Discussion:** Approximately half of the patients seeking psychiatric emergency services for a supposed anxiety attack have a poorly treated or undiagnosed medical condition contributing to their symptoms. The symptoms of anxiety include dizziness/lightheadedness, paresthesias, chest pain, palpitations/tachycardia, sensations of shortness of breath, tachypnea, and nausea or abdominal upset. The approach to evaluation and management of these patients should include an assessment of the patient's airway, breathing, and circulation and focused history and physical examination to evaluate for time-sensitive conditions. Providers should assess for red flags such as family history significant for cardiac or neurological diagnoses, at what age the first presentation of the patient's symptoms occurred, fluctuations of consciousness, autonomic instability, and focal neurologic deficits.

**Conclusions:** Certain medical conditions and medications mimic, manifest, produce, or exacerbate anxiety, creating difficulty in distinguishing anxiety from its medical imitators. Through consideration of other disease processes with palpitations, dyspnea, and chest pain with assessment for red flags such as new onset of anxiety after the age of 40, emergency physicians

can provide a more comprehensive evaluation to decrease diagnostic bias and diagnose a dangerous mimic.

**Keywords:** anxiety, mimic, chest pain, shortness of breath, palpitations, nervousness, dizziness

### **CASE:**

A 55-year-old male with a previous medical history significant for hypertension and diabetes presents to the emergency department (ED) with the chief complaint of chest discomfort and shortness of breath. The patient reports the onset of his symptoms to be about one hour ago while at dinner with family. Review of systems is remarkable for palpitations and generalized weakness, but the patient denies nausea, dizziness or lightheadedness, headache, a history of blood clots, or recent illness. As you review his vital signs, the patient states that he has had this feeling before and was diagnosed with anxiety. The patient's blood pressure is 160/90, heart rate is 122, respiratory rate is 20, oxygen saturation is 98% on room air, and his temperature is 98.7°F. Upon physical examination, the patient is alert and oriented to person, place, and time and looks mildly uncomfortable. Cranial nerves II-XII are intact with no motor or sensory deficits and the patient has equal grip strength bilaterally. Pupils are 3mm bilaterally and reactive to light and accommodation. The patient is tachypneic with lungs clear to auscultation bilaterally, anteriorly and posteriorly. The heart is tachycardic with no murmurs, rubs, or gallops, no jugular venous distention or carotid bruits are appreciated, the chest is nontender, and the patient has equal and strong radial and distal pulses bilaterally. The patient's abdomen is soft and non-tender and no lower extremity edema is noted. An ECG and chest x-ray are ordered, while nurses establish IV access and collect blood for a complete blood count (CBC), complete

metabolic panel (CMP), thyroid stimulating hormone (TSH), point of care glucose, and troponin. Because this patient cannot be PERC'd out and he is considered low risk for a pulmonary embolus (PE), according to Well's Criteria, a D-dimer is ordered.

## **INTRODUCTION:**

According to the Centers for Disease Control and Prevention, anxiety remains the most common mental health diagnosis in the general population-characterizing 18.1% of all adults in the United States.<sup>1,2</sup> The innumerable and non-specific symptoms that patients experience associated with anxiety and panic attacks combined with the limited accessibility for some to primary care is one of the reasons for the exponential increase in mental health-related emergency department (ED) visits. Between the years 1992 and 2003, mental health-related ED visits increased by 75% with 26.1% of these being anxiety-related.<sup>3,4</sup> More recently, between the years 2006 and 2013, this rate has increased by 15%.<sup>2</sup>

Although stress, anxiety, and depression are diagnostic codes in 61% of mental health disorder related ED visits and one in eight visits involve mental and substance use disorders, patients with mental illnesses tend to have serious underlying chronic medical conditions that should not be overlooked.<sup>2,3,5,6</sup> As stated in the "Emergency Psychiatric Assessment" chapter in the second edition of Emergency Medicine, "approximately 50% of patients seeking psychiatric emergency services have a poorly treated or undiagnosed medical condition contributing to their symptoms."<sup>6</sup> The following is information to help identify red flags in the patient presenting with anxiety-like symptoms in an effort to evaluate and treat life-threatening disorders.

## **DISCUSSION:**

### **Pathophysiology**

While the exact etiology of anxiety is not explicit, several theories involving the release of certain hormones and neurotransmitters have been suggested.<sup>7,8</sup> Any disruption in the body's perceived homeostasis can be defined as a stressor, causing a cascade of hormonal events.<sup>9</sup> These hormones alter the serotonergic and noradrenergic neurotransmitter systems leading to the feelings and symptoms of anxiety.<sup>8</sup>

Although not the only mechanism by which this occurs, the release of corticotropin-releasing factor (CRF) from the hypothalamus initiates the hypothalamic-pituitary-adrenal (HPA) axis generating the release of corticotropin from the pituitary followed by the discharge of glucocorticoid and epinephrine from the adrenal cortex.<sup>7,9</sup> Under normal circumstances, this sequence is controlled by negative feedback; however, once an individual experiences a physiologic change in homeostasis or emotional arousal, hyperactivation of the autonomic nervous system can result with the amygdala existing as its primary modulator.<sup>9</sup>

Dopamine and  $\gamma$ -aminobutyric acid (GABA) are presumed to have some involvement.<sup>7</sup> Specifically, it is theorized that GABA is decreased in episodes of anxiety considering benzodiazepines, which act to enhance the effect of GABA at its receptor, result in a sedative and anxiolytic state.<sup>7,10</sup>

### **Presenting Signs and Symptoms**

Symptoms of anxiety include dizziness/unsteadiness/lightheadedness, headache, paresthesias, amnesia, fatigue, restlessness, emotional lability, irritability, chest pain or discomfort, palpitations/tachycardia, sensations of shortness of breath or smothering/dyspnea, tachypnea, nausea or abdominal upset, muscle tension, chills or hot flushes, diaphoresis, trembling/shaking, and dry mouth.<sup>7,8</sup>

### **Diagnosis and Treatment**

As mentioned previously, there is no lab test or imaging study to definitely diagnose anxiety. However, psychiatrists utilize the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) to make a clinical diagnosis after emergent organic causes of psychiatric crisis have been eliminated.

According to the American Academy of Family Physicians (AAFP), the following are clinical recommendations for the treatment of Generalized Anxiety Disorder (GAD) and Panic Disorder (PD):

#### **Level A Recommendation**

- Psychotherapy is as effective as medication for GAD and PD with Cognitive Behavioral Therapy (CBT) having the best evidence<sup>11</sup>

#### **Level B Recommendations**

- Physical activity is a cost-effective treatment for GAD and PD<sup>11</sup>
- Selective Serotonin Reuptake Inhibitor's (SSRI's) are considered first line therapy for GAD and PD<sup>11</sup>

- Antidepressants + Benzodiazepines are quick treatments, but do not improve longer term outcomes<sup>11</sup>

The above treatments, while they are Level A and Level B recommendations, are not entirely practical in the ED. With an acutely agitated or moderately anxious patient, therapies that possess quick onset of action are the most useful. Benzodiazepines are the recommended first-line medications for the short-term management of anxiety.<sup>7,8</sup>

In those patients with milder anxiety symptoms, oral benzodiazepines (clonazepam 0.25mg or alprazolam 0.50mg) are suggested.<sup>7</sup> If symptoms are more severe, benzodiazepines can be given intravenously in the following doses: lorazepam 0.50mg or diazepam and midazolam in 1-2 mg increments.<sup>7</sup> These medications should be used for acute treatment in the ED, with few pills provided upon discharge. Follow up should be ensured with primary care.

### **Medical Mimics of Anxiety**

Certain medical conditions and medications mimic, manifest, produce, or exacerbate anxiety, creating difficulty in distinguishing anxiety from pathologic derangements.<sup>7</sup> Despite this challenge, emergency physicians must be able to recognize and act quickly with regard to the medical mimics of anxiety that are time-sensitive. These life-threatening conditions will be reviewed below and are organized by body system, with the last table representing commonly encountered toxidromes.

#### **Table 1 – Neurologic Mimics of Anxiety**

#### **Table 2 – Cardiac Mimics of Anxiety**



### **Table 3 – Pulmonary Mimics of Anxiety**

### **Table 4 – Endocrine/Metabolic Mimics of Anxiety**

### **Table 5 – Toxidromic Mimics of Anxiety**

#### **ED Approach**

Not only do the above conditions emulate anxiety, but infection, electrolyte abnormalities, medication withdrawal, and overdose/toxicity of illicit drugs also have the potential to manifest similar signs and symptoms. When addressing the patient presenting to the ED with complaints of chest discomfort, shortness of breath, and tachycardia (among others previously mentioned), the emergency physician should:

- Perform a focused history and physical examination by first addressing the stability of the patient's condition (airway, breathing, circulatory status).
- Due to anxiety's numerous presentations, it is important to evaluate and differentiate it from a medical emergency.
  - Medical or organic → First presentation of symptoms occurs at age >40, possible fluctuation of consciousness, and autonomic instability.<sup>27</sup>
  - Anxiety → First presentation of symptoms occurs between ages 18-45, family history of anxiety, patient is concerned about losing control, and occurrence of recent/anticipated life event.<sup>27</sup>
- Evaluate for cardiac cause in a patient presenting with cardiovascular symptomatology, checking a screening TSH in a patient presenting with complaints of anxiety<sup>27</sup>, or getting a urine drug screen when a toxic cause is suspected.

- Benzodiazepines are the recommended short-term management option (clonazepam 0.25mg or alprazolam 0.50mg).

## **CONCLUSIONS:**

Anxiety is a component of nearly two-thirds of the diagnostic codes of emergency department visits; however, there are many medical mimics of anxiety that cannot be over-looked. The most important element of approaching and managing patients who present to the ED with anxiety-like symptoms is resuscitation and stabilization first, followed by, additional studies (like ECG) to help rule out time-sensitive pathologies. The history and physical examination are crucial to the diagnosis, in addition to being able to recognize red flags that make anxiety less likely.

Anxiety should always be a diagnosis of exclusion and the emergency physician's differential should always take into account the neurological system, cardiovascular system, respiratory components, endocrine and metabolic derangements, and toxidromes. Continual re-evaluation of the patient while in the ED and appropriate follow-up, if discharged, will aid in decreasing morbidity and mortality.

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## ARTICLE SUMMARY

1. Why is this topic important? Anxiety is the most common mental health diagnosis in the general population. And because of the complex and innumerable non-specific signs and symptoms associated with it, many life-threatening conditions may present similarly.
2. What does this review attempt to show? This review highlights the various signs and symptoms of anxiety, the approach, evaluation, and management of medical mimics of anxiety, and the pearls and pitfalls associated with these diagnoses.
3. What are the key findings? Anxiety is a diagnosis of exclusion with potential morbidity and mortality if not careful. It can be characterized by chest pain, shortness of breath, dizziness, and palpitations, among many other non-specific signs and symptoms.

Providers must be able to assess for life threatening conditions while providing resuscitation. Red flags that should be recognized and addressed include: fluctuations of consciousness, autonomic instability, and if the patient was greater than or equal to forty years of age when he/she experienced their first episode of “anxiety.” Through acknowledgement and understanding of the medical mimics of anxiety, providers can appropriately formulate a differential for the patient presenting with anxiety symptoms in an effort to not miss deadly diagnoses.

4. How is patient care impacted? This analysis of anxiety and its mimics provides an overview of the signs and symptoms of anxiety, the complexities of anxiety, and an approach to the identification and management of its associated deadly differential.



**Table 1 – Neurologic Mimics of Anxiety**

<b>Presentation</b>	<b>Clinical Condition</b>	<b>Pearl/Pitfall</b>	<b>Treatment</b>
Auras that are commonly described as déjà-vu experiences, feelings of fear, panic, and anxiety, or GI upset	Medial Temporal Lobe Epilepsy <sup>12</sup>	<p>Most common form of focal or partial epilepsy</p> <p>Usually begins at the end of the first or second decade of life following a non-infectious febrile seizure or head injury</p> <p>Associated with hippocampal sclerosis on MRI</p>	<p>Anti-epileptic medications</p> <p>If resistant to medication, surgery</p>
Difficulty swallowing or breathing; paradoxical breathing; tachypnea	Myasthenic Crisis <sup>13,14,15</sup>	<p>Frequently seen in young women (age 20-30) and men (&gt;50)</p> <p>Caused by medication dose missed, a respiratory infection, emotional stress, surgery or other stressor</p> <p>Pulse oximetry is not a good indicator of respiratory strength in these patients</p>	<p>Stabilize patient (airway, breathing, cardiovascular support)</p> <p>Discontinue cholinesterase inhibitors in intubated patients</p> <p>Transfer to ICU</p> <p>Identify and address triggers</p> <p>Symptomatic pharmacologic therapy/plasmapheresis</p>
Dizziness; loss of balance or coordination; severe headache; sudden numbness or weakness	Cerebrovascular Accidents	<p>Evaluate via NIH stroke scale</p> <p>Motor symptoms will often accompany cognitive symptoms</p> <p>Obtain rapid glucose</p>	<p>CT head without contrast</p> <p>If ischemic and no contraindications for tPA, administer tPA</p>

**Table 2 – Cardiac Mimics of Anxiety**

Presentation	Clinical Condition	Pearl/Pitfall	Treatment
Acute onset of tachycardia and palpitations; lightheadedness; dizziness; chest pain; dyspnea	Supraventricular Tachycardia <sup>16</sup>	<p>May be physiologic (i.e. sinus tachycardia during an asthma exacerbation) or pathologic</p> <p>More common in females than males</p> <p>Most common dysrhythmia found in pediatric populations</p> <p>Treatment is dependent on specific arrhythmia and whether the patient is hemodynamically stable</p>	<p>Order and analyze electrocardiogram (ECG) QRS duration (narrow vs. wide), characterization of onset and termination, heart rate, and relative position of P wave within the R-R interval</p> <p>Hemodynamically <u>Unstable</u>: Shock with DC synchronized cardioversion beginning at 50J and increasing to 200J as needed. If prior to cardioversion, the patient had atrial fibrillation for &gt;48 hours, initiate heparin therapy followed by outpatient oral anticoagulation (follow-up with cardiology)</p> <p>Hemodynamically <u>Stable</u> Paroxysmal Supraventricular Tachycardia (PSVT): If narrow QRS (&lt;120 msec), perform vagal maneuvers. If vagal maneuvers lead to termination, treat underlying dysrhythmia</p> <p>For PSVT, if vagal maneuvers fail, administer IV adenosine 6mg with a repeat dose of 12mg if first dose has no effect</p> <p>-----</p> <p>Rate control for atrial flutter or fibrillation is with beta-blockers or calcium channel blockers</p> <p>-----</p> <p>Follow-up with cardiology or electrophysiologist</p>
Chest pain or discomfort; dizziness; nausea; paresthesias; palpitations; dyspnea; diaphoresis	Myocardial Infarction <sup>17</sup>	<p>Assess for high risk features such as diaphoresis, nausea/vomiting, pain radiating to bilateral arms &gt; right arm &gt; left arm</p> <p>Class risk factors helpful</p>	<p>ECG, chest x-ray, and serial troponins</p> <p>Administer non-enteric coated aspirin 325 mg</p> <p>Place patient on oxygen (if necessary saturation &lt; 94%)</p>

		<p>on a population level, but are limited for the patient in the ED</p> <p>Elderly, diabetics, and younger females often present atypically</p>	<p>Treat pain with nitroglycerin if not hypotensive, along with opioid analgesics</p> <p>ST elevation MI requires reperfusion therapies (percutaneous intervention or thrombolytics), anticoagulation, antiplatelet medications</p>
<p>Dyspnea; increased peripheral edema; fatigue; rapid or irregular heartbeat; chest pain</p>	<p>Congestive Heart Failure<sup>18</sup></p>	<p>Increasing prevalence with age</p> <p>Most common cause of acute dyspnea among elderly patients in the ED</p>	<p>ECG, chest x-ray, renal function panel, troponin, and bedside ultrasound</p> <p>Treatment is aimed at the cause for decompensation</p> <p>In severe cases, patient is first stabilized with regard to airway, breathing, and circulation</p> <p>Nitroglycerin for preload optimization should be provided if not hypotensive</p>
<p>Chest pain; shortness of breath</p>	<p>Takotsubo Syndrome<sup>19</sup></p>	<p>Weakening of the left ventricle as the result of severe emotional or physical distress</p> <p>Symptoms are indistinguishable from those of an MI and an ECG may show abnormalities similar to those of an MI</p> <p>For a definitive diagnosis: no evidence of coronary blockages on angiogram, a rapid but small rise in cardiac biomarkers (in an MI, cardiac biomarkers take longer to rise but peak higher), an image that shows ballooning</p>	<p>Standard heart failure medications (beta-blockers, ACE inhibitors, and diuretics) are recommended</p> <p>Percutaneous catheterization is recommended</p>

**Table 3 – Pulmonary Mimics of Anxiety**

Presentation	Clinical Condition	Pearl/Pitfall	Treatment
Shortness of breath and chest tightness	Asthma Exacerbation <sup>20</sup>	<p>Patient will often have accompanied coughing and wheezing</p> <p>In adults and children &gt;5 years of age, serial measurements of lung function (using FEV1 or PEF) performed at presentation and again in 30-60 minutes helps to categorize the severity of the exacerbation</p> <p>For children &lt;5 years of age and infants, pulse oximetry at presentation and repeated 1 hour after initial treatment is recommended for assessment of lung function</p>	<p>Severity determines treatment</p> <p>Administer oxygen to maintain saturation &gt;90%</p> <p>Administer inhaled beta-2-agonist (2.5-5 mg of Albuterol every 20 minutes for 3 doses in <u>adults</u>; 0.15 mg/kg every 20 minutes for 3 doses in <u>children &lt;12 years of age</u>)</p> <p>Inhaled ipratropium bromide (shown to reduce hospitalizations) can be added to beta-2-agonist therapy (3mL every 20 minutes for 3 doses in <u>adults</u>; 1.5mL every 20 minutes for 3 doses in <u>children &lt;12 years of age</u>)</p> <p>Systemic corticosteroids are administered to all patients with moderate-to-severe exacerbations and to those who do not respond to initial beta-2-agonist therapy</p> <p>Epinephrine 0.3-0.5 mg of 1:1,000 epinephrine every 20 minutes for 3 doses in <u>adults</u>; 0.01 mg/kg up to 0.3-0.5 mg of 1:1,000 epinephrine every 20 minutes for 3 doses in <u>children &lt;12 years of age</u> or 0.25 mg of terbutaline every 20 minutes for 3 doses in <u>adults</u>; 0.01 mg/kg of terbutaline every 20 minutes for 3 doses in <u>children &lt;12 years of age</u>)</p>
Worsening dyspnea	Chronic Obstructive Pulmonary Disease <sup>21,22</sup>	<p>Patients will also complain of cough, increased sputum production, and sputum purulence</p> <p>May present similar to</p>	<p>Order chest x-ray, venous blood gas, CBC, and serum electrolytes</p> <p>US may be beneficial in differentiating from other causes of dyspnea</p>

		congestive heart failure	<p>Beta agonists, anticholinergics, corticosteroids recommended</p> <p>Antibiotics may be needed for fever, increased sputum production/purulence, and concern for pneumonia</p> <p>Noninvasive positive pressure ventilation can decrease rate of intubation and mortality rate</p>
<p>Pleuritic chest pain; dyspnea; rapid or irregular heartbeat; excessive sweating; lightheadedness; dizziness</p>	<p>Pulmonary Embolism<sup>23</sup></p>	<p>Consider risk factors: history of cancer, heart disease, recent surgery or prolonged immobility, smoking, supplemental estrogen, and pregnancy</p> <p>Focused examination including hemodynamic status required</p>	<p>Risk stratify (Well's score) and then apply the PERC rule for low risk patients</p> <p>Moderate risk patients or those with positive PERC should have D-dimer</p> <p>Positive D-dimer or high risk should be assessed with CT chest with contrast</p> <p>Systemic anticoagulation is the mainstay treatment.</p> <p>-----</p> <p>Unfractionated or low-molecular weight heparin with an initial bolus of 80U/kg of ideal body weight followed by a constant infusion of 16-18U/kg of ideal body weight per hour. Novel oral anticoagulants can be provided as an alternative</p>

**Table 4 – Endocrine/Metabolic Mimics of Anxiety**

<b>Presentation</b>	<b>Condition</b>	<b>Pearl/Pitfall</b>	<b>Treatment</b>
Tachycardia; palpitations; tremor; nervousness; nausea/vomiting; hyperthermia; sleeplessness	Thyrotoxicosis and Thyroid Storm <sup>24,25</sup>	<p>Presentation is usually triggered by a stressor on the body (acute infection, trauma, or surgery)</p> <p>Can be caused by abrupt discontinuation of anti-thyroid medications or administration of iodine-containing materials</p> <p>May or may not have prior diagnosis of hyperthyroidism</p> <p>In the setting of thyroid storm, cortisol should be very high</p>	<p>Block thyroid hormone production via Methimazole (20-25mg PO every 4-6 hours) or Propylthiouracil (600-1000mg PO loading dose with 200-400mg PO every 6-8 hours)</p> <p>-----</p> <p>Propylthiouracil is safe in pregnancy</p> <p>-----</p> <p>Block the release of thyroid hormone via potassium iodide (5 drops PO every 6-8 hours) or Lugol's solution (5-10 PO every 6-8 hours)</p> <p>Beta-blockade via IV propranolol (1-2 mg/min every 15 minutes with a max dose of 10mg followed by 40-80mg PO every 4-6 hours, or diltiazem (60-90mg PO every 6-8 hours) if propranolol is contraindicated</p> <p>Block conversion of T4 to T3 via corticosteroids (dexamethasone 2mg IV every 6 hours)</p>
Dyspnea; tachycardia; skin flushing	Carcinoid Syndrome <sup>26</sup>	<p>Caused by carcinoid tumors most commonly found in the GI tract and lungs</p> <p>Most do not cause this syndrome until they're advanced</p>	Symptomatic relief, surgery to remove the cancer, or chemotherapy
Anxiety (refractory to treatment); hypertension (persistent or episodic); abdominal pain; headaches;	Pheochromocytoma <sup>27,28</sup>	Causes excess catecholamine release	<p>Initially treat with Phenoxybenzamine (10mg BID and increased by 10-20mg every third day for 7-10 days) prior to surgery</p> <p>Once BP has decreased and been controlled, add propranolol (10m</p>

diaphoresis; palpitations			QID)  Fluids and surgery after alpha blockade
Tachycardia; diaphoresis; nausea/vomiting; abdominal pain; dizziness; weakness	Addisonian Crisis <sup>29</sup>	Caused by extremely low levels of cortisol  Often associated with some trigger/stressor (infection common)  Hyponatremia and hyperkalemia common	Provide stress dose corticosteroid – hydrocortisone  Treat underlying stressor
Tachycardia; hypertension; insomnia; paresthesias; motor weakness; acute abdominal pain	Acute Porphyria <sup>30</sup>	Measure urinary porphobilinogen (normally 0-4 mg/day, increased to 20-200 mg/L in acute porphyria)	Panhematin (3-4 mg/kg IV once daily for 4 days (if diagnosis is confirmed in the ER, give first dose)  Supportive and symptomatic treatment (to correct electrolyte imbalances)

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**Table 5 – Toxidromic Mimics of Anxiety**

Presentation	Condition	Pearl/Pitfall	Treatment
Tachycardia; mydriasis; hyperthermia; dry, flushed skin	Anticholinergic Toxicity <sup>31,32</sup>	Anticholinergics include: antihistamines, anti- parkinsonian medications, antipsychotics, antispasmodics, cyclic antidepressants, jimson weed, scopolamine, among others  Toxidrome Mnemonic: “Hot as a hare, dry as a bone, red as a beet, blind as a bat, mad as a hatter, full as a flask”	Diagnosis should include fingerstick glucose and ECG  Symptomatic treatment, frequent reassessment, and close observation  Antidote: Physostigmine (1- 2mg in <u>adults</u> and 0.02 mg/kg with a maximum of 0.5mg in <u>children</u> ) administered intravenously over a 5-minute period ----- Atropine should be kept near and given in titrated doses if patient displays cholinergic symptoms ----- Physostigmine is contraindicated in patients with a QRS interval >100 msec  For TCA overdose, give IV push of sodium bicarbonate (44-88 mEq in <u>adults</u> and 1- 2 mEq/kg in <u>children</u> ), followed by bicarbonate infusion
Tachycardia; mydriasis; hyperthermia; diaphoresis; agitation; hypertension; seizures	Sympathomimetics <sup>31,33</sup>	Sympathomimetics include: amphetamines, aminophylline/theophylline, caffeine, cocaine, ephedrine, LSD, PCP, methylphenidate, etc.  Toxidrome can mimic hypoglycemia, withdrawal syndromes, and anticholinergic toxicity	Symptomatic treatment, while paying close attention to vital signs and body temperature  Oxygen should be administered because of the increased metabolic demand  Fluid resuscitation to the point of euvoolemia is recommended



			1 <sup>st</sup> line treatment for cocaine toxicity are benzodiazepines
Tachypnea; hyperpnea; tachycardia; nausea/vomiting; progressive CNS deterioration	Aspirin (Salicylates) <sup>34</sup>	Salicylate toxicity may induce acute lung injury (“non-cardiogenic pulmonary edema”)  Present similarly to sepsis  Aspirin toxicity in adults is characterized by a mixed respiratory alkalosis and metabolic acidosis	Therapeutic serum acetylsalicylic acid measurement is 15-30 mg/dL  Treat with multiple dose activated charcoal, fluid resuscitation, urine alkalinization (via sodium bicarbonate), and hemodialysis
Tachycardia; hypotension; dysrhythmias; nausea/vomiting; abdominal pain; hyper/hypoventilation	Toxic Alcohols <sup>31,35</sup>	Acidosis from ethylene glycol or methanol may not be evident until several hours after exposure, with anion gap in late stages (Osmolol gap present early in course)  Most patients demonstrate some level of CNS depression, which does not correlate with peak serum concentrations or accumulation of metabolites  May appear intoxicated with negative alcohol level	Treat with fomepizole (15 mg/kg, then 10 mg/kg every 12 hours for 4 doses, then increase to 15 mg/kg every 12 hours until serum alcohol is < 20 mg/dL) if witnessed, there is clinical suspicion, or when serum concentration of a toxic alcohol is >20 mg/dL  Hemodialysis is often required for definitive therapy
Anxiety; mild tremor; autonomic instability; delirium	Ethanol Withdrawal <sup>36</sup>	Delirium tremens (DT) develop in 5% of patients who develop symptoms of alcohol withdrawal  Signs and symptoms of alcohol withdrawal should be evaluated using the Revised Clinical Institute Withdrawal Assessment for Alcohol (CIWA-Ar) scale to aid in determining the severity of the withdrawal	Supportive care is the mainstay of treatment (resuscitation with fluids and replacement of electrolyte deficiencies)  Benzodiazepines (midazolam 10 mg IV or lorazepam 4mg every 10 minutes as needed) is the major treatment for withdrawal  Refractory to benzodiazepines: propofol or

			phenobarbital
Anxiety; tachypnea; diaphoresis; restlessness; tachycardia; nausea/vomiting	Opioid Withdrawal <sup>36</sup>	<p>Unlike alcohol withdrawal, opioid withdrawal is not life-threatening</p> <p>Most patients are discharged with outpatient treatment</p>	<p>Treatment is aimed at stabilization of cardiopulmonary status and symptomatic therapy</p> <p>Opioid replacement should be guided by the cause of withdrawal (cessation of prescription meds, methadone therapy for addiction, or decreased recreational intake)</p> <p>20mg PO or 10mg IM of opioids/methadone replacement can reverse withdrawal symptoms without overdose</p> <p>Clonidine (0.1-0.3mg every hour) can decrease symptoms</p> <p>Benzodiazepines can decrease symptoms, as well, but caution in prescribing as outpatient</p>

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